

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 08 February 2001 (08.02.01)		
International application No. PCT/SE00/00522	Applicant's or agent's file reference	
International filing date (day/month/year) 17 March 2000 (17.03.00)	Priority date (day/month/year) 19 March 1999 (19.03.99)	RECEIVED APR 13 2001 Technology Center 2100
Applicant SAGEFALK, Willy et al		

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
27 September 2000 (27.09.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer R. E. Stoffel Telephone No.: (41-22) 338.83.38
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PCT**REQUEST**

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No. _____

International Filing Date _____

Name of receiving Office and "PCT International Application" _____

Applicant's or agent's file reference
(if desired) (12 characters maximum) _____

Box No. I TITLE OF INVENTION A DIGITAL CAMERA HAVING PANNING AND/OR TILTING FUNCTIONALITY; AND AN IMAGE ROTATING DEVICE FOR SUCH A CAMERA	
Box No. II APPLICANT	
Name and address: (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) Axis AB Schéelevägen 16 S-223 70 LUND Sweden	<input type="checkbox"/> This person is also inventor. Telephone No. _____ Facsimile No. _____ Teleprinter No. _____
State (that is, country) of nationality: Sweden	State (that is, country) of residence: Sweden
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
Name and address: (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.) SAGEFALK, Willy Möllevångsvägen 8 S-222 40 LUND Sweden	This person is: <input type="checkbox"/> applicant only <input checked="" type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality: Sweden	State (that is, country) of residence: Sweden
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<input checked="" type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.	
Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: <input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative	
Name and address: (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country.) Ström & Gulliksson AB (Any of Tore Ström, Jonas Gulliksson, Stellan Petri, Leif Karlsson and Björn Andersson) P O Box 4188 S-203 13 MALMÖ Sweden	Telephone No. +46 40 757 45 Facsimile No. +46 40 23 78 97 Teleprinter No. _____
<input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.	

Sheet No. 2

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
<i>If none of the following sub-boxes is used, this sheet should not be included in the request.</i>	
<p><small>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</small></p> <p>ABRAHAMSSON, Lars Videgatan 1B S-582 46 LINKÖPING Sweden</p>	<p><small>This person is:</small></p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (if this check-box is marked, do not fill in below.)</p>
<p><small>State (that is, country) of nationality:</small></p> <p>Sweden</p>	<p><small>State (that is, country) of residence:</small></p> <p>Sweden</p>
<p><small>This person is applicant for the purposes of:</small></p> <p> <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box </p>	
<p><small>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</small></p>	<p><small>This person is:</small></p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (if this check-box is marked, do not fill in below.)</p>
<p><small>State (that is, country) of nationality:</small></p>	<p><small>State (that is, country) of residence:</small></p>
<p><small>This person is applicant for the purposes of:</small></p> <p> <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box </p>	
<p><small>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</small></p>	<p><small>This person is:</small></p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (if this check-box is marked, do not fill in below.)</p>
<p><small>State (that is, country) of nationality:</small></p>	<p><small>State (that is, country) of residence:</small></p>
<p><small>This person is applicant for the purposes of:</small></p> <p> <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box </p>	
<p><small>Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</small></p>	<p><small>This person is:</small></p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only (if this check-box is marked, do not fill in below.)</p>
<p><small>State (that is, country) of nationality:</small></p>	<p><small>State (that is, country) of residence:</small></p>
<p><small>This person is applicant for the purposes of:</small></p> <p> <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box </p>	
<p><input type="checkbox"/> Further applicants and/or (further) inventors are indicated on another continuation sheet.</p>	

Sheet No. 3

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ **AP** ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA** Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

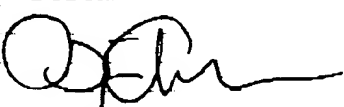
- | | |
|---|---|
| <input checked="" type="checkbox"/> AE United Arab Emirates | <input checked="" type="checkbox"/> LR Liberia |
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BG Bulgaria | |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IS Iceland | |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | <input checked="" type="checkbox"/> ZA South Africa |
| | <input checked="" type="checkbox"/> ZW Zimbabwe |

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☐
- ☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

Sheet No. 4.....

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 19.03.1999	9901038-1	Sweden		
item (2)				
item (3)				
<input checked="" type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): <small>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</small>				
Box No. VII INTERNATIONAL SEARCHING AUTHORITY				
Choice of International Searching Authority (ISA) <small>(If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):</small> ISA / SE		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority): Date (day/month/year) Number Country (or regional Office)		
Box No. VIII CHECK LIST; LANGUAGE OF FILING				
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 7 claims : 2 abstract : 1 drawings : 4 sequence listing part of description : Total number of sheets : 18		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):		
Figure of the drawings which should accompany the abstract: 1		Language of filing of the international application: English		
Box No. IX SIGNATURE OF APPLICANT OR AGENT				
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request). Malmö, March 16, 2000 Ström & Gulliksson AB  Björn Andersson				
<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> For receiving Office use only </div> <div style="width: 35%;"> 2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: </div> </div>				
1. Date of actual receipt of the purported international application:		6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.		
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:				
4. Date of timely receipt of the required corrections under PCT Article 11(2):				
5. International Searching Authority (if two or more are competent): ISA /				
For International Bureau use only				
Date of receipt of the record copy by the International Bureau:				

This sheet is not part of and does not count as a sheet of the international application.

PCT

FEE CALCULATION SHEET

Annex to the Request

For receiving Office use only

International application No.

Date stamp of the receiving Office

Applicant's or agent's
file reference W 3313-048

Applicant

Axis AB

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE

1000

T

2. SEARCH FEE

8510

S

International search to be carried out by SE

(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

Basic Fee

The international application contains _____ sheets.

first 30 sheets

3540

b1

remaining sheets

additional amount

b2

Add amounts entered at b1 and b2 and enter total at B

3540

B

Designation Fees

The international application contains _____ designations.

8

760

6080

D

number of designation fees
payable (maximum 10)

amount of designation fee

Add amounts entered at B and D and enter total at I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

9620

I

4. FEE FOR PRIORITY DOCUMENT (if applicable)

P

5. TOTAL FEES PAYABLE

19130

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time.

MODE OF PAYMENT

☐ authorization to charge
deposit account (see below)

☐ bank draft

☐ coupons

☒ cheque

☐ cash

☐ other (specify):

☐ postal money order

☐ revenue stamps

DEPOSIT ACCOUNT AUTHORIZATION (this mode of payment may not be available at all receiving Offices)

The RCV _____

☐ is hereby authorized to charge the total fees indicated above to my deposit account.

☐ (this check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.

☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

Deposit Account No.

Date (day/month/year)

Signature

See Notes to the fee schedule

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 19 JUN 2001

WIPO PCT

14

Applicant's or agent's file reference W3313-048		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
FOR FURTHER ACTION		
International application No. PCT/SE00/00522	International filing date (day/month/year) 17/03/2000	Priority date (day/month/year) 19/03/1999
International Patent Classification (IPC) or national classification and IPC G03B37/00		RECEIVED OCT 04 2001 Technology Center 2600
Applicant AXIS AB		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 27/09/2000	Date of completion of this report 15.06.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Artelsmair, G Telephone No. +49 89 2399 8989



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/SE00/00522

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-7 as originally filed

Claims, No.:

1-3 as received on 11/05/2001 with letter of 11/05/2001

Drawings, sheets:

1-4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/SE00/00522

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-3
	No: Claims
Inventive step (IS)	Yes: Claims 1-3
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-3
	No: Claims

2. Citations and explanations see separate sheet

- 1 The application relates to a digital camera having a panning/tilting functionality.
- 2 Nearest prior art is US-A-3868706 (D1) which describes a camera according to the preamble of claims 1 and 3.

A similar device is known from US-A-4499490 (D2).

The other documents cited in the ISR only relate to the general technological background.

- 3 Concerning claim 1:

In the prior art cameras as described in D1 or D2 there arises the problem that when the mirror is rotated the image produced by the camera will become distorted. According to claim 1 this problem is solved by the provision of image transforming means which means are adapted to rotate the digital image by an angle related to the angle of rotation of the mirror.

Although image transformation of digital images is known per se for different purposes there is no indication in the cited prior art which would make it obvious for a skilled person to use image transformation means in a camera with panning/tilting functionality in order to automatically compensate for image rotating effects.

- 4 Concerning claim 3:

The subject-matter of claim 1 differs from what is described in D1 or D2 in that a second mirror mounted externally to the camera housing and a second rotational member for rotating the second mirror is foreseen. This arrangement allows a more compact design and a wider field of view. Since all the cameras described in the cited prior art are single mirror devices it is difficult to argue that the arrangement according to claim 3 could be derived in an obvious manner from the available prior art.

11-05-2001

PCT/SE00/00522

CLMS

010510 W:\3311048 amended PCT claims.doc Ba/lj

CLAIMS

1. A digital camera (300) having panning and/or tilting functionality, comprising: a camera housing (6) with an optical input (400), such as a lens or objective (8); an image capturing unit (500) for producing a digital image from light received through the optical input; a controller (600); a first mirror (9) mounted externally to the camera housing (6); and an image rotating device (200), which is connected to the controller (600) and is adapted to rotate the first mirror at an angle of rotation with respect to the optical axis of the input (400, 8) of the camera housing (6), characterized by

an image transforming unit (800), which is connected to the image capturing unit (500) and is adapted to rotate the digital image, as captured by the image capturing unit (500), by an angle related to the angle of rotation of the first mirror (9).

2. A digital camera as in claim 1, further comprising a second mirror (10) mounted externally to the camera housing (6), wherein the image rotating device (200) is adapted to rotate the second mirror at a second angle of rotation with respect to the optical input (400, 8) of the camera housing (6).

3. An image rotating device (200) for a digital camera (300) having a camera housing (6), an optical input (400), such as a lens or objective (8), and an image capturing unit (500) for producing a digital image from light received through the optical input, the image rotating device comprising a first mirror (9) mounted externally to the camera housing (6), and a first rotational member (5, 7) for rotating the first mirror at a first angle of

15-05-2001

PCT/SE00/00522

CLMS

010310 W:\3333048 amended PCT claims.doc BA/13

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rotation with respect to the optical axis of the input
(400, 8) of the camera housing, characterized by
a second mirror (10) mounted externally to the camera
housing (6); and

5 a second rotational member (3, 7) for rotating the
second mirror at a second angle of rotation with respect
to the optical input (400, 8) of the camera housing,

wherein the first and second mirrors are arranged
along a common optical axis.

10

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ :**G03B 37/00****A1**

(11) International Publication Number:

WO 00/57246

(43) International Publication Date: 28 September 2000 (28.09.00)

(21) International Application Number: PCT/SE00/00522

(22) International Filing Date: 17 March 2000 (17.03.00)

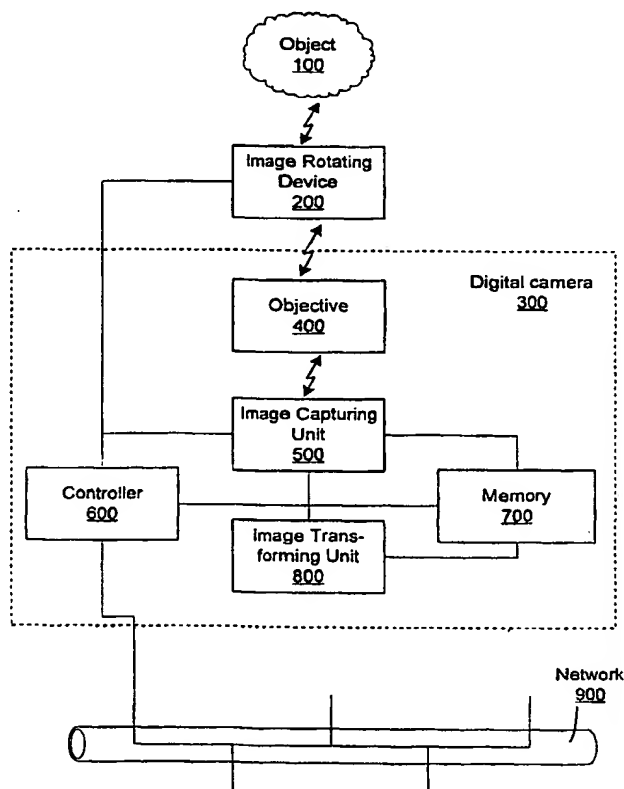
(30) Priority Data:
9901038-1 19 March 1999 (19.03.99) SE(71) Applicant (for all designated States except US): AXIS AB
[SE/SE]; Scheelevägen 16, S-223 70 Lund (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): SAGEFALK, Willy
[SE/SE]; Möllevångsvägen 8, S-222 40 Lund (SE).
ABRAHAMSSON, Lars [SE/SE]; Videgatan 1B, S-582 46
Linköping (SE).(74) Agents: STRÖM, Tore et al.; Ström & Gulliksson AB, P.O.
Box 4188, S-203 13 Malmö (SE).(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG,
BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB,
GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG,
KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK,
MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG,
SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU,
ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL,
SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ,
MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE,
DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE),
OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML,
MR, NE, SN, TD, TG).**Published***With international search report.**Before the expiration of the time limit for amending the
claims and to be republished in the event of the receipt of
amendments.*(54) Title: A DIGITAL CAMERA HAVING PANNING AND/OR TILTING FUNCTIONALITY, AND AN IMAGE ROTATING
DEVICE FOR SUCH A CAMERA

(57) Abstract

A digital camera (300) has panning and/or tilting functionality and comprises: a camera housing (6) with an optical input (400), such as a lens or objective (8); an image capturing unit (500) for producing a digital image from light received through the optical input; and a controller (600). A first mirror (9) is mounted externally to the camera housing (6). An image rotating device (200) receives an angular displacement control signal from the controller (600) and rotates the first mirror at an angle with respect to the optical input (400, 8) of the camera housing (6).



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**A DIGITAL CAMERA HAVING PANNING AND/OR TILTING
FUNCTIONALITY, AND AN IMAGE ROTATING DEVICE FOR SUCH A
CAMERA**

5 **Technical Field**

The present invention relates to a digital camera having panning and/or tilting functionality, and more specifically to a digital camera having a camera housing with an optical input, such as a lens or objective, an
10 image capturing unit and a controller. The invention also relates to an image rotating device for providing the panning and/or tilting functionality of such a digital camera.

15 **Background Art**

A common example of a digital camera with panning and/or tilting functionality is a web camera, which e.g. may be mounted at a given location for the purpose of surveillance, production monitoring, etc. The web camera
20 comprises an optical input in the form of a lens or objective and an image capturing unit for producing a digital image from light received from the optical input. Usually, the image capturing unit comprises a CCD element (Charge Coupled Device). The web camera has software and
25 hardware for allowing the camera to be connected to a given network, such as an Ethernet or Token Ring network. The web camera is arranged to produce digital images at a given rate, such as 1-25 images per second. In order to increase the visual volume covered by the web camera, the camera is
30 provided with mechanical means for panning and/or tilting the camera. Generally speaking, "panning" means rotating the camera by a given angle (normally 0°-360°) in a horizontal plane, and "tilting" means rotating the camera by a given angle (normally 0°-180°) in a vertical plane.

35 In prior art web cameras the panning and/or tilting functionality is obtained by moving the whole camera or at

least the objective thereof. Since the camera and objective have a considerable weight, such an approach involves complex, large and expensive mechanics. Furthermore, the speed at which the camera may be panned or tilted is restricted due to the large mass, that has to be moved accordingly.

Summary

It is an object of the present invention to provide a digital camera, which allows faster and more accurate panning and/or tilting, thereby allowing the camera to produce more images per time unit. Furthermore, it is an object of the present invention to provide an image rotating device, to be mounted externally to the digital camera, for providing efficient and rapid panning and/or tilting functionality, without requiring large or expensive mechanics.

The above objects are achieved by providing the digital camera with an image rotating device having a mirror mounted externally to the camera housing and having a rotational member for rotating the mirror with respect to the optical input (lens or objective) of the camera housing in response to an angular displacement control signal received from a controller of the digital camera.

Other objects, features and advantages of the present invention will appear from the following detailed disclosure, from the appended claims as well as from the drawings.

Brief Description of the Drawings

A preferred embodiment of the present invention will now be described in more detail, reference being made to the accompanying drawings, in which:

FIG 1 is a schematic block diagram of the overall structure of a digital camera according to the preferred embodiment,

FIG 2 is a first sideview of the image rotating device and the camera, to which it is mounted,

FIG 3 is a second sideview of the image rotating device and the camera shown in FIG 2, and

FIG 4 is a topview of the image rotating device shown in FIGs 2 and 3.

Detailed Disclosure

Referring to FIG 1, a digital camera 300 is illustrated in a basic modular form. The digital camera 300 is arranged to produce one or several digital image(s) of a generic object 100, which may be any physical object that is present in a volume optically covered by the digital camera 300. An inventive image rotating device 200 is mounted externally to the digital camera 300 in front of an optical input 400 of the digital camera. The optical input 400 is a generally known lens or objective. The purpose of the image rotating device 200 is to extend the available field of view of the digital camera 300 in at least one plane, preferably in a horizontal plane as well as in a vertical plane. A preferred embodiment of the image rotating device 200 will be described in more detail with reference to FIGs 2-4.

As shown in FIG 1, the digital camera 300 further comprises an image capturing unit 500, which is provided with appropriate means for producing a digital image representative of the object 100. Preferably, the image capturing unit 500 comprises a CCD element (Charge Coupled Device), the internal structure of which is believed to be well-known to a man skilled in the art. The digital camera 300 also has a controller 600 for controlling the image capturing unit 500 as well as the external image rotating

device 200. The controller 600 is operatively connected not only to the device 200 and the unit 500 but also to a digital memory 700 for storing images captured by the image capturing unit 500. Furthermore, the digital camera 300 may comprise an image transforming unit 800, the purpose of which is to rotate the digital image to compensate for image rotating effects caused by the image rotating device 200, when the field of view is panned or tilted. The image transforming unit 800 is responsive to an angle of rotation of the image rotating device 200 with respect to the objective 400 and uses this angle of rotation when transforming the digital image to compensate for the current pan and/or tilt angle. To perform such image transforming, i.e. to rotate a digital image in one or more than one direction, is believed to be well within reach of a man skilled in the art of digital cameras. Therefore, the internal structure of the image transforming unit 800 will not be described herein.

The memory 700 may be implemented by any commercially available memory, such as an EEPROM memory.

As indicated in FIG 1, the digital camera 300 may be connected to a network 900, such as an Ethernet or Token Ring network, which in turn may be part of the Internet. In such an application, the controller 600 of the digital camera 300 is provided with appropriate software for allowing the digital camera 300 to act as a web camera available on the network 900, i.e. a web server that produces digital images.

The pan and/or tilt angle of the digital camera 300, or more specifically the angle(s) by which the image rotating device changes the field of view of the camera 300 with respect to a central axis of the objective 400, may be set and changed by a user of the camera by accessing the controller 600 through the network 900. Alternatively, the

pan and/or tilt angle(s) may be controlled from a computer directly connected to the digital camera 300.

A preferred embodiment of the image rotating device 200 will now be described in more detail with reference to
 5 FIGs 2-4. The following elements are shown in these drawings:

Qty	Ref. No.	Name
1	19	Frame
1	18	Timing belt tightener
1	17	Belt wheel
1	16	Timing belt
1	15	Belt wheel
1	14	Timing belt
1	13	Timing belt tightener
2	12	Optical sensor
1	11	Mirror holder
1	10	Tilting mirror
1	9	Fixed mirror
1	8	Camera lens (objective)
2	7	Motor
1	6	Camera housing
1	5	Mirror wheel
1	4	Bevel gear
1	3	Tilt shaft
2	2	Fixing part
1	1	Guiding wheel

The image rotating device 200 has a mirror system,
 10 comprising a first fixed mirror 9 and a second tilting mirror 10. The fixed mirror 9 is mounted directly in front of the objective 8 at an angle of 37° relative to the

optical center axis of the camera 300. The fixed mirror 9 is mounted to a mirror wheel 5, which is rotatable around the objective and hence provides a field of view with an angle of rotation of between 0° and 360° .

5 In the center of the field of view the tilting mirror 10 is mounted, so that the axis of rotation thereof is perpendicular to the optical center axis of the camera. The tilting mirror 10 is carried on the mirror wheel 5, thereby causing the tilting mirror 10 to rotate around the objective 8 together with the fixed mirror 9. Thanks to the geometrical arrangement of the mirrors 9 and 10 with respect to the objective 8, it is possible to monitor a large volume in a short time.

15 The tilting mirror 10 is attached to a mirror holder 11, which in turn is journalled in the mirror wheel 5 between two fixing parts 2. Opposite to the mirror wheel 5 a slightly smaller guiding wheel 1 is concentrically mounted. A tilt shaft 3 is eccentrically mounted to the mirror wheel, so as to cause the tilting mirror 10 to move. 20 The guiding wheel 1 transmits its motion to the tilt shaft 3 and from the tilt shaft 3 through a bevel gear 4 to the mirror holder 11. The arrangement resembles a planetary gear, where the guiding wheel represents a sun pinion and the tilt shaft represents a planet pinion. The mirror wheel 25 acts as holder of the planet pinion.

When the mirror wheel does not move, if the guiding wheel is rotated, the tilt shaft 3 will rotate around its own axis, wherein the mirror holder 11 will be rotated around its axis of rotation. Hence, the tilting mirror 10 is rotated with respect to the mirror wheel 5, and the center axis of the field of view will be angled with respect to the optical center of the camera. If the mirror wheel 5 and the guiding wheel 1 rotates at the same angular velocity, there will be no relative motion in the tilt 35 shaft and consequently no rotation of the mirror

holder/mirror around its axis of rotation. However, the mirror wheel 5 as a whole will rotate with the fixed mirror 9 and the tilting mirror 10 at a constant angle to the optical center axis of the camera.

5 In other words, by rotating the mirror wheel 5 and the guiding wheel 1 synchronously, the field of view may be rotated 360° for any given tilt angle. Then, if the wheels are rotated relative to each other, the angle of the mirror holder 11 will change, and the field of view may be again
10 be rotated 360° for a new tilt angle. In this way, a very large volume around the camera may be covered, and images may be obtained for any given location within this large volume.

The mirror wheel 5 and the guiding wheel 1 are driven
15 by respective motors 7. Belt wheels 15, 17, timing belts 14, 16 and timing belt tighteners 13, 18 are provided, as shown in FIGs 2-4.

The inventive image rotating device provides at least the following advantages:

- 20 • Low moment of inertia for rotating parts
- High pan/tilt adjustment speed, short time between angular settings
- High setting accuracy
- Compact design
- 25 • Few structural components
- Low manufacturing cost
- Flexible design
- Simple pan/tilt control
- Wide field of view

30 The present invention has been described above with reference to a preferred embodiment. However, other embodiments than the one disclosed herein are possible within the scope of the invention, as defined by the appended independent patent claims.

CLAIMS

1. A digital camera (300) having panning and/or tilting functionality, comprising: a camera housing (6) with an optical input (400), such as a lens or objective (8); an image capturing unit (500) for producing a digital image from light received through the optical input; a controller (600); a first mirror (9) mounted externally to the camera housing (6); and an image rotating device (200), which is connected to the controller (600) and is adapted to rotate the first mirror at an angle of rotation with respect to the optical input (400, 8) of the camera housing (6), **characterized by**

an image transforming unit (800), which is connected to the image capturing unit (500) and is adapted to rotate the digital image, as captured by the image capturing unit (500), by an angle related to the angle of rotation of the first mirror (9).

2. A digital camera as in claim 1, further comprising a second mirror (10) mounted externally to the camera housing (6), wherein the image rotating device (200) is adapted to rotate the second mirror at a second angle of rotation with respect to the optical input (400, 8) of the camera housing (6).

3. An image rotating device (200) for a digital camera (300) having a camera housing (6), an optical input (400), such as a lens or objective (8), and an image capturing unit (500) for producing a digital image from light received through the optical input, the image rotating device comprising a first mirror (9) mounted externally to the camera housing (6), and a first rotational member (5, 7) for rotating the first mirror at a first angle of

rotation with respect to the optical input (400, 8) of the camera housing, **characterized** by

a second mirror (10) mounted externally to the camera housing (6); and

5. a second rotational member (3, 7) for rotating the second mirror at a second angle of rotation with respect to the optical input (400, 8) of the camera housing.

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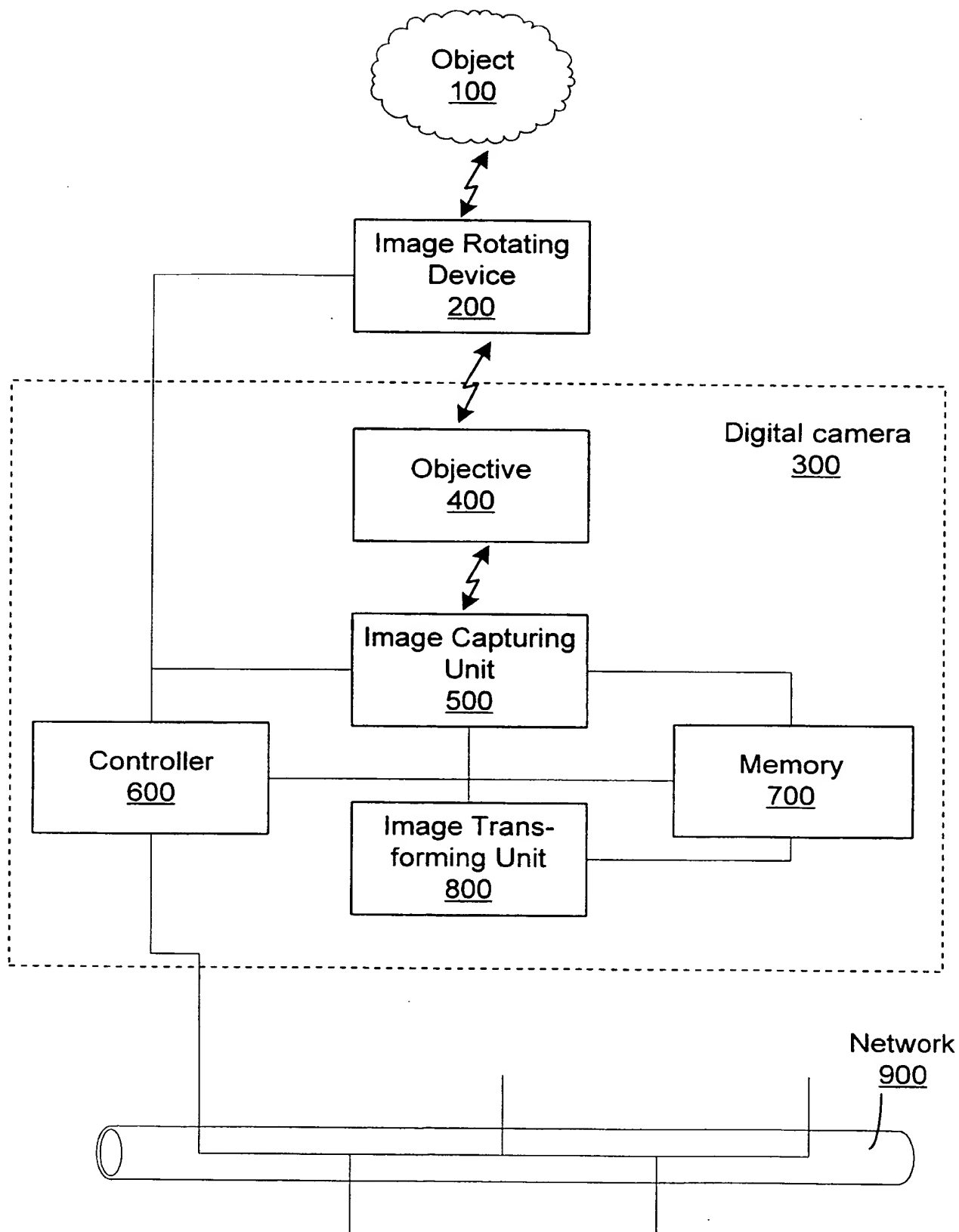


FIG 1

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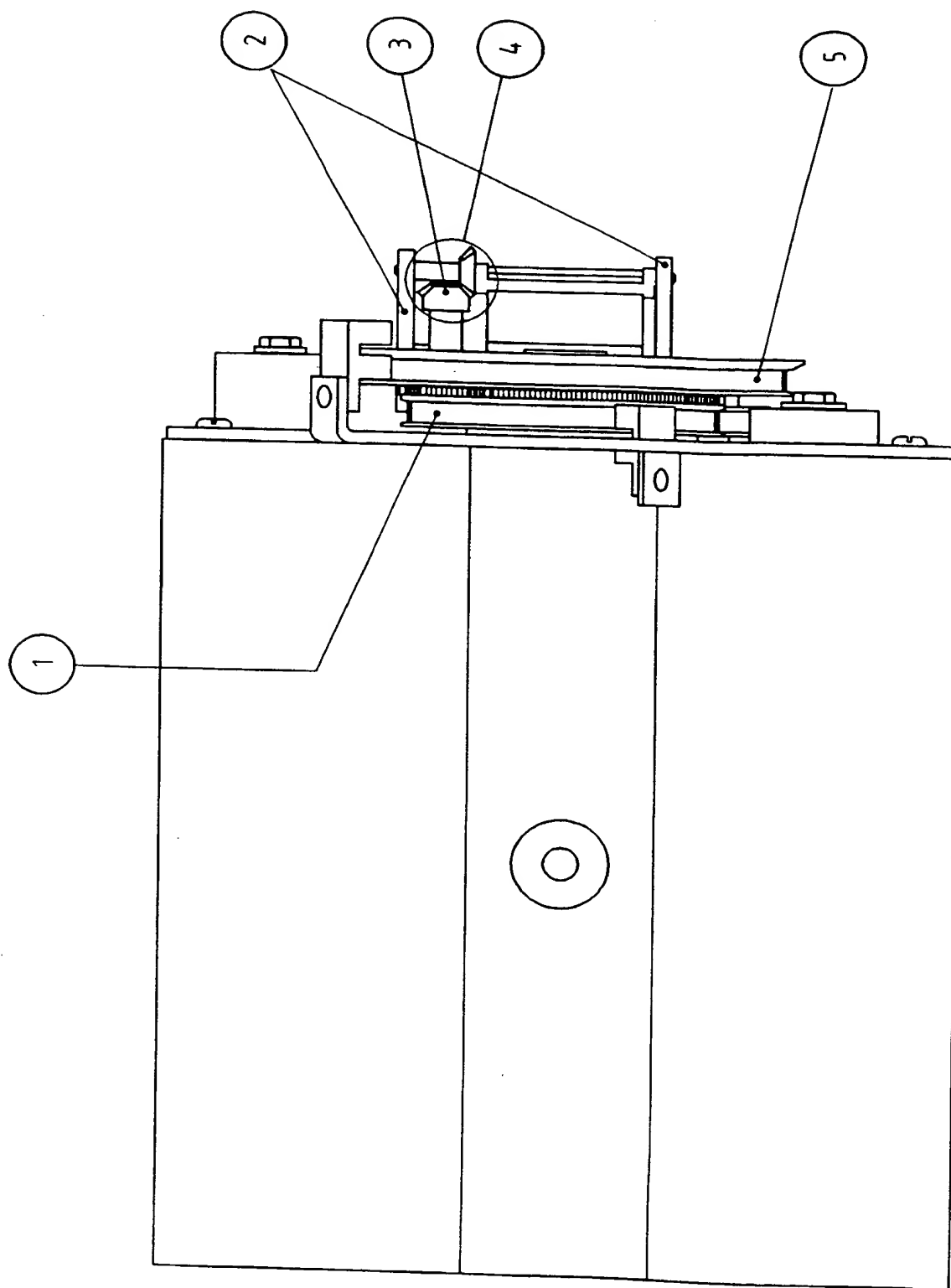


FIG 2

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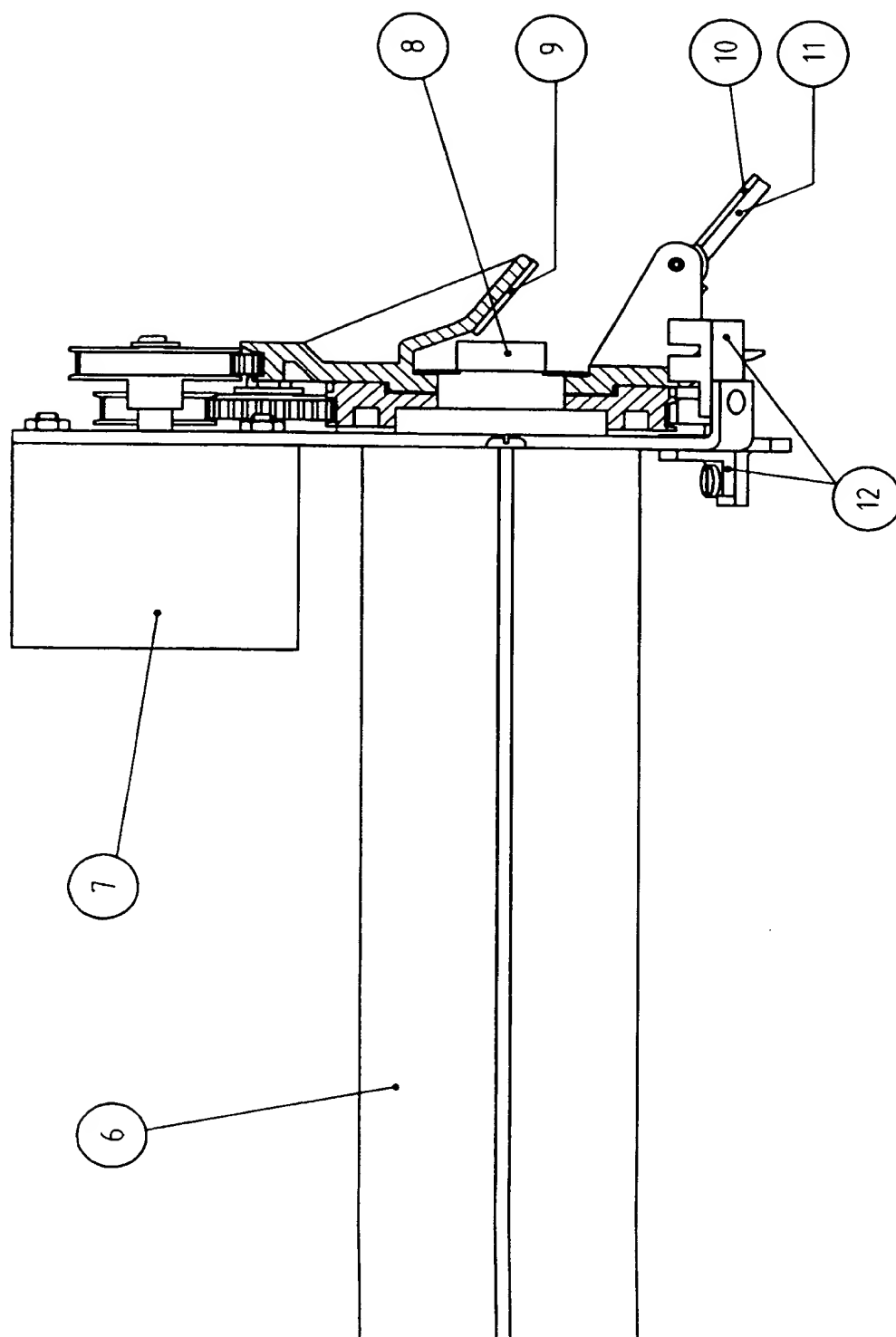


FIG 3

4/4

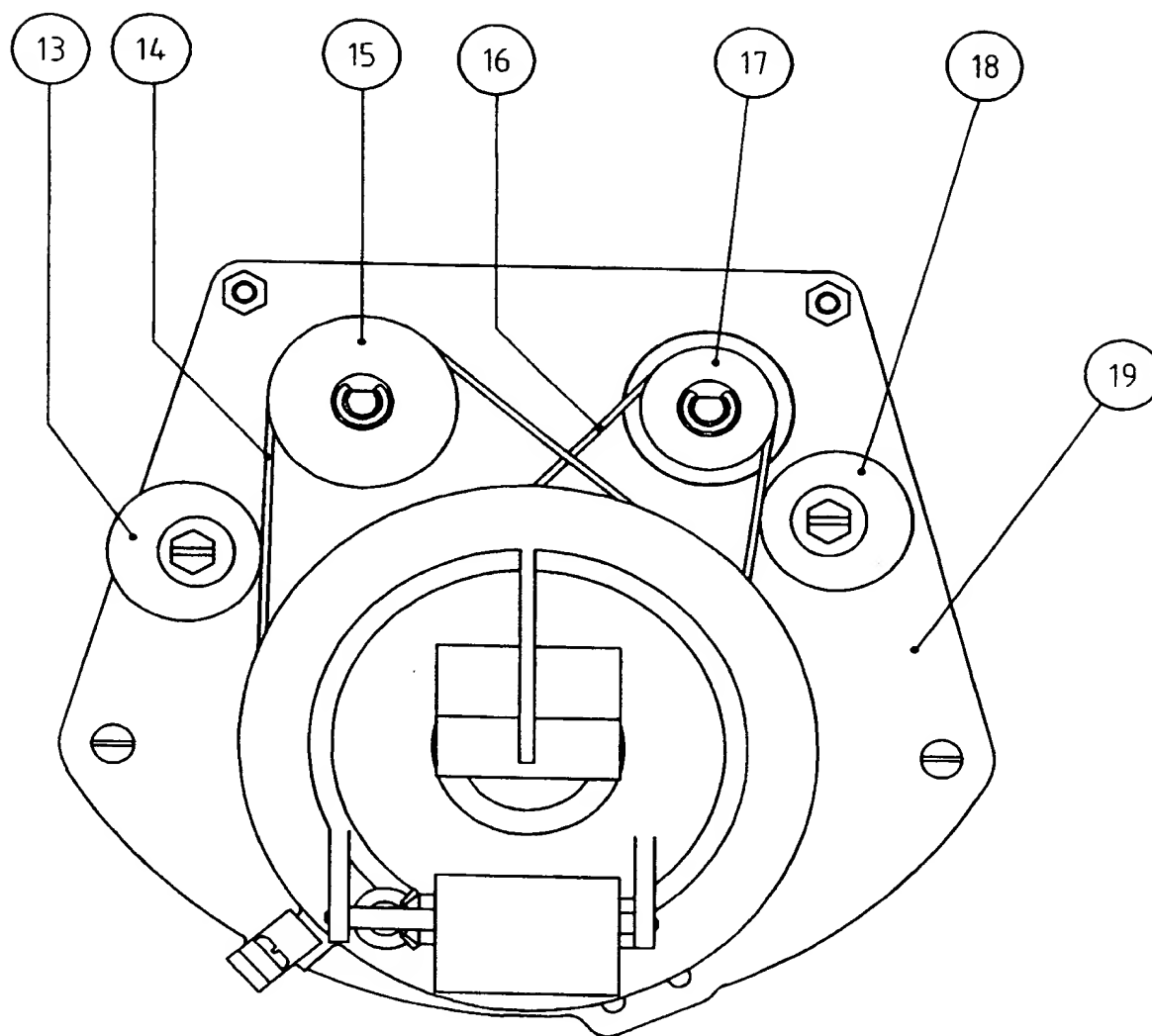


FIG 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/00522

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G03B 37/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G03B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

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WPI, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5717512 A (CHMIELEWSKI, JR. ET AL), 10 February 1998 (10.02.98) --	1-3
A	US 3868706 A (STEINGOLD), 25 February 1975 (25.02.75) --	1-3
A	US 4499490 A (MORGAN), 12 February 1985 (12.02.85) --	1-3
A	US 5606368 A (CORRADINI), 25 February 1997 (25.02.97) -- -----	1-3

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

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Date of mailing of the international search report

18 -07- 2000

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Facsimile No. +46 8 666 02 86

Authorized officer

Björn Kallstenius / JA A

Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.

PCT/SE 00/00522

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
US	5717512	A	10/02/98	AU 3006297 A WO 9743677 A	05/12/97 20/11/97
US	3868706	A	25/02/75	NONE	
US	4499490	A	12/02/85	NONE	
US	5606368	A	25/02/97	NONE	